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VEGETATIVE PROPAGATION OF *PITTOSPORUM FLORIBUNDUM* – A LESSER KNOWN MULTIPURPOSE TREE SPECIES

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ABSTRACT

The present investigation was conducted to test the effect of auxin-chemical formulations and cutting types of Pittosporum floribundum. Significantly maximum, sprouting (100 %) and callusing (56.67 %) was observed in $T_4C_3S_2$ and $T_6C_2S_2$ combinations respectively. Whereas significantly maximum, rooting (60 %), mean numbers of roots (8.4) and mean root length (8.07 cm) was observed in cuttings treated with $T_4C_3S_1$ chemical formulation. While the performance of cuttings with regard to all the above-mentioned parameters was poor in control. Thus it has been concluded that Pittosporum floribundum can be propagated vegetatively through cuttings by employing suitable auxin-chemical formulation in mid-Himalayan conditions.

KEYWORDS: Pittosporum Floribundum, Auxin, Cutting Type, Sprouting and Rooting

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INTRODUCTION

Pittosporum floribundum Wight & Arn. (Family-Pittosporaceae) a small evergreen multipurpose tree found along the foot hills of outer Himalayas from Punjab eastwards to the hills of Assam and it ascends up to 2400 m above mean sea level (amsl) in the hills of peninsular India. It is commonly used as medicine, fuel wood, fodder, grown as ornamental tree and both flower and wood yield an essential oil.

Ayurveda suggests *P. floribundum* plant parts against skin diseases, piles and itches. A high dose of bark, which is aromatic, bitter, and greenish black acts as narcotic and is used as antidote to snake poison, in general weakness, fever, and chronic bronchitis and also used as a stimulant [Nagamalleswari et al, 2013]. The narcotic action of the bark is due to the presence of yellow oleoresins, it also contains chemical constituents like saponins and Pittosporins [Nadkarni 2004]. Bark powder 0.5-1.0 gm is taken orally daily twice in case of asthma [Savithramma et al, 2007]. Oil used for rheumatism, skin diseases, sprains, leprosy, bruises, sciatica, chest infections, opthalmia, cutaneous diseases, secondary syphilis and, supports the presence of glycosides [www.Scribd.com/doc/pittosporum *Pittosporum floribundum* W.&A. for 6102281- Medicinal plants. 2011].

Aforesaid gifts from the nature are accompanied with the problems of seed availability and regeneration of *Pittosporum floribundum*; hence it was felt to standardize techniques for vegetative means of propagation for this species. Of all the methods of vegetative propagation, owing to the simplicity and cost effectiveness, stem cuttings were considered to study.

MATERIALS AND METHODS

Study Site

The current investigation was conducted at farm nursery of the Department of Silviculture and Agroforestry, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Himachal Pradesh (India.) during 2012. The experimental site is located at an elevation of 1200 m amsl in the mid-Himalayan zone between 30˚ 51' N latitude and 76˚ 11' E. The area experiences a wide range of temperature with a minimum of 1˚C in winter to a maximum of 37˚C during hot summer and mean annual temperature being 19.8˚C with an a annual rainfall of 110-115 cm.

Source of Cuttings

Cuttings were obtained from healthy, vigorously growing trees. Three different types of cuttings, the upper cuttings were taken from the top portion while basal cuttings from the lower part of the shoot and coppice cuttings from the coppice shoots, each 12-15cm long of 1-2 cm diameter with at least 3-4 nodes were taken and wrapped in moist sphagnum moss to avoid desiccation during transportation.

Preparation of Rooting Hormone Formulations

Each cutting was given two vertical cuts at the base with sharp razor blade and dipped in fungicide (0.1 % aqueous solution of bavistin) for five seconds just prior to application of different formulations of rooting powders. The chemical formulations of NAA (Naphthalene-acetic acid, laboratory reagent, Indian made, having minimum assay- 99%) were prepared in talcum powder [Blazich 1988].

Application of Rooting Hormones

The cuttings were treated with rooting powder formulation just before planting. The basal end of each cutting was dipped in the rooting powder formulated as per each treatment till the cut end was fully covered with the hormone formulation. Excess powder was removed off by tapping the base of cutting gently against the edge of the container.

Planting Operations

The cuttings were planted 5-7 cm deep in the sunken beds after treatment. Irrigation and weeding was carried out manually as per the need. Drenching of captan (0.1%), mixture of bavistin (0.1%) and indofil (0.1%) was given for prevention of disease.

OBSERVATIONS RECORDED

Observations on sprouting per cent, callusing per cent, rooting per cent, mean number of roots and mean root length (cm) were collected and the data obtained was subjected to statistical analysis [Gomez & Gomez1984].

Package of Treatments

Table 1: To Study the Effect of Auxin– Chemical Formulations and Cutting Types on Rooting Behavior of *Pittosporum floribundum* Cuttings in Different Seasons

Auxin – Chemical Formulations	Cutting Types	Seasons
T_1 : Control – (talc only) T_2 : 3% captan + 3% sucrose - talc T_3 : 0.2% NAA + 3% captan + 3% sucrose- talc T_4 : 0.4% NAA + 3% captan + 3% sucrose- talc T_5 : 0.6% NAA + 3% captan + 3% sucrose- talc T_6 : 0.8%NAA + 3% captan + 3% sucrose- talc	C_1: Upper C_2: Basal C_3: Coppice shoots	S_1: Rainy S_2: Spring

RESULTS AND DISCUSSIONS

It was evident from the study that auxin concentrations x cutting type x season (TxCxS) (Table 1) interaction brought about significant differences in per cent sprouting, callusing, rooting, mean number of roots and mean root length of the cuttings. 100 % sprouting was recoded when cuttings were treated with $T_4C_3S_2$ combination (Table 2). This may be due to the fact that application of auxin might have resulted in the breakdown of starch into soluble sugars and bulk of this was used up in the growing of new sprouts. The superiority of coppice cuttings in sprouting may be due to more food reserve (sugar and carbohydrate) and peroxidase enzyme activity in coppice when compared to tree cuttings, similar results also reported that cuttings from seedling rooted better, with more roots ensuring better survival, than cuttings from mature trees [Bhardwaj & Mishra 2005].

The significantly superior performance of *Pittosporum floribundum* cuttings was stuck during February-March than July. This may be due to the fact that cuttings collected in spring contained higher level of sugar and total carbohydrates content and had higher peroxidase enzyme activity but low in nitrogen content [Munde et al, 2010]. Sprouting in $T_4C_3S_2$ was followed by $T_4C_3S_1$ (93.33 %) and $T_4C_2S_2$ and $T_6C_3S_2$ with 83.33 per cent success each. While least sprouting of 16.67 per cent was observed in spring season when apical cuttings were maintained as control.

Per cent callusing, it was clear (Table 2) that a maximum callusing of 56.67 per cent was observed in $T_6C_2S_2$ combination followed by $T_2C_2S_1$ (40.00%) and $T_4C_2S_1$, $T_6C_2S_2$ and $T_6C_3S_1$ with 33.33 per cent success each. This may be due to unfavorable auxin-nutrient (sugar) balance in meristematic cells of the rooting zone.

Significantly maximum rooting was obtained from $T_4C_3S_1$ combination (60.00 %). This was however, statistically at par with $T_6C_3S_1$ combination giving 56.67 per cent rooting. Least rooting of 3.33 per cent was observed in $T_1C_1S_2$ combination where apical cuttings are maintained as control.

Significantly maximum mean numbers of roots (8.4) were seen in $T_4C_3S_1$ combination, which was followed by $T_6C_3S_1$ and $T_4C_2S_1$ giving statistically at par values of 7.4 and 7.3 respectively. The minimum mean number of roots of 0.33 was observed in $T_1C_1S_2$ combination where apical cuttings were maintained as control during rainy season. This may be due to the fact that cuttings were raised during spring to early summer when temperature conditions ranged from 22 to 32^{o}c during day combined with lower night temperature (14-20^{o}c) has worked well. The lower air temperature reduces transpiration rate and suppresses bud development [Kaul 2008].

In case of mean root length, significantly maximum value of 8.07 cm was recorded in $T_4C_3S_1$ combination followed by $T_4C_3S_2$ (7.73cm), $T_4C_2S_1$ (7.70 cm) and $T_5C_2S_1$ (7.23 cm) giving statistically at par values. Minimum root length was recorded in $T_1C_1S_2$ (3.60 cm) combination followed by $T_1C_1S_1$ and $T_1C_2S_2$ combinations with 3.97 cm of mean

root length each (Plate 1 & 2). Enhanced mean root length might have resulted because of chemical substances at the base of the cuttings enhancing the interaction between applied hormone and rhizocaline which stimulated meristem to divide quickly and form roots, similar research results reported that cuttings from seedling rooted better, with more roots ensuring better survival, than cuttings from mature trees [Bhardwaj & Mishra 2005]. Carbohydrate status of cuttings, fungicide captan and auxin actively stimulated rooting as a result of control of disease and/or a synergistic hormonal effect on rooting by the fungicide.

CONCLUSIONS

Thus, it can be concluded that *Pittosporum floribundum*, an evergreen tree of sub-Himalayan tract can be propagated vegetatively through cuttings by employing suitable auxin- chemical formulation (0.4 % NAA + 3 % captan + 3 % sucrose-talc). Propagation through cuttings taken from coppice shoots during spring season has been recommended for multiplication of this species. To obtain maximum rooting (60.00 %), coppice cuttings have to be treated with best auxin-chemical formulation (0.4 % NAA + 3 % captan + 3 % sucrose-talc) and planted during spring season.

REFERENCES

1. *Bhardwaj, D. R. Mishra, V.K. (2005). Vegetative propagation of Ulmus villosa: effects of plant growth regulators, collection time, type of donor and position of shoot on adventitious root formation in stem cuttings. New Forest. 29: 105- 116.*
2. *Blazich, F.A. (1988). Chemical and formulations used to promote adventitious rooting. In: Davis T, Hassig B and Sankhla N, eds. Adventitious root formation in cuttings. Discorides Press Portland. pp. 117-131.*
3. *Gomez, K.A. Gomez, A.A. (1984). Statistical Procedures for Agricultural Research. John Viley and Sons. New York, 304-308.*
4. *Kaul K (2008). Variation in rooting behaviour of stem cuttings in relation to their origin in Taxus wallichiana Zucc. New Forests, 36: 217-22.*
5. *Munde, A.D. Shamet, G.S. Shazmeen, Q. (2010). Effect of auxin-chemical formulations and cutting types on the rooting behaviour of Murraya koenigii Linn. streng in relation to biochemical changes. Indian Journal of Tropical Biodiversity,18(1): 101-104.*
6. *Nadkarni, K.M. (2004). The Indian Meteria medica, Inj. Single Herbs org, 1 :174.*
7. *Nagamalleswari, K., Yasodamma, N., Binny, A.J.R. (2013). Phytochemical screening, antibacterial and antifungal studies of Pittosporum floribundum Wight & Arn. leaf, bark, fruit and seed extracts, International Journal of Pharma and Bio Sciences, 4(2): 464 – 474.*
8. *Savithramma, N., Sulochana, Ch., Rao, K.N., (2007) Ethnobotanical Survey of plants used to treat Asthma in Andhra Pradesh, Journal of Ethnopharmacology, 113(1): 54-61.*
9. *www.Scribd.com/doc/pittosporum Pittosporum floribundum W.&A. for 6102281- Medicinal plants. 2011.*

APPENDICES

Table 2: Effect of Auxin Formulation x Cutting Type x Season (TxCxS) Interaction on Sprouting, Callusing, Rooting and Root Characteristics of *Pittosporum floribundum* Cuttings

Treatments (TxCxS)	Sprouting (%)	Callusing (%)	Rooting (%)	Mean Number of Roots	Mean Root Length (cm)
$T_1C_1S_1$	16.67 (23.86)	0.00 (0.00)	10.00 (18.43)	2.6	3.97
$T_1C_1S_2$	20.00 (26.57)	0.00 (0.00)	3.33 (10.51)	0.33	3.60
$T_1C_2S_1$	20.00 (26.57)	10.00 (18.43)	10.00 (18.43)	4.33	3.97
$T_1C_2S_2$	53.33 (46.92)	10.00 (18.43)	10.00 (18.43)	1.67	4.0
$T_1C_3S_1$	40.00 (39.23)	10.00 (18.43)	16.67 (23.86)	4.5	4.1
$T_1C_3S_2$	46.67 (43.08)	3.33 (10.51)	10.00 (18.43)	2.5	4.1
$T_2C_1S_1$	26.67 (31.00)	16.67 (23.86)	20.00 (26.57)	5.13	5.8
$T_2C_1S_2$	26.67 (31.00)	10.00 (18.43)	10.00 (18.43)	2.67	5.37
$T_2C_2S_1$	36.67 (37.23)	40.00 (39.23)	33.33 (35.26)	5.68	6.47
$T_2C_2S_2$	66.67 (54.78)	26.67 (31.09)	26.67 (31.09)	4	5.63
$T_2C_3S_1$	43.33 (41.07)	30.00 (33.21)	40.00 (39.23)	6.41	6.13
$T_2C_3S_2$	66.67 (54.99)	16.67 (23.86)	30.00 (33.21)	4.7	5.8
$T_3C_1S_1$	23.33 (28.78)	3.33 (10.51)	10.00 (18.43)	4.26	5.4
$T_3C_1S_2$	30.00 (33.00)	6.67 (14.97)	10.00 (18.43)	2	4.87
$T_3C_2S_1$	40.00 (39.15)	20.00 (26.57)	26.67 (31.09)	5.33	5.93
$T_3C_2S_2$	66.67 (54.99)	10.00 (18.43)	10.00 (18.43)	3.11	5.3
$T_3C_3S_1$	50.00 (45.00)	13.33 (21.41)	36.67 (37.27)	6.17	5.8
$T_3C_3S_2$	73.33 (59.01)	6.67 (14.97)	16.67 (24.10)	4.54	5.33
$T_4C_1S_1$	30.00 (33.21)	13.33 (21.41)	26.67 (31.09)	6.32	6.8
$T_4C_1S_2$	40.00 (39.23)	10.00 (18.43)	16.67 (24.10)	3.50	5.73
$T_4C_2S_1$	66.67 (55.08)	33.33 (35.26)	50.00 (45.00)	7.3	7.70
$T_4C_2S_2$	83.33 (65.90)	16.67 (23.86)	33.33 (35.26)	5.8	7.03
$T_4C_3S_1$	93.33 (77.71)	23.33 (28.78)	60.00 (50.77)	8.4	8.07
$T_4C_3S_2$	100.00 (90.00)	16.67 (23.86)	46.67 (43.08)	6.05	7.73
$T_5C_1S_1$	23.33 (28.78)	10.00 (18.43)	10.00 (18.43)	4.6	6.37
$T_5C_1S_2$	23.33 (28.78)	0.00 (0.00)	10.00 (18.43)	2.33	5.23
$T_5C_2S_1$	40.00 (39.23)	23.33 (28.78)	30.00 (33.21)	4.9	7.23
$T_5C_2S_2$	76.67 (61.22)	16.67 (23.86)	20.00 (26.57)	2.83	6.1
$T_5C_3S_1$	70.00 (57.29)	16.67 (23.86)	43.33 (41.07)	5.65	6.8
$T_5C_3S_2$	80.00 (63.44)	16.67 (23.86)	23.33 (28.78)	3.33	6.2
$T_6C_1S_1$	23.33 (28.78)	16.67 (23.86)	20.00 (26.57)	5.33	6.1
$T_6C_1S_2$	30.00 (33.21)	20.00 (26.57)	10.00 (18.43)	3	5.07
$T_6C_2S_1$	60.00 (50.77)	13.33 (21.41)	30.00 (33.21)	5.93	6.97
$T_6C_2S_2$	73.33 (58.91)	56.67 (48.83)	30.00 (33.21)	3.72	5.67
$T_6C_3S_1$	76.67 (61.22)	33.33 (35.26)	56.67 (48.83)	7.4	6.37
$T_6C_3S_2$	83.33 (66.15)	23.33 (28.78)	43.33 (41.07)	5.12	6.17
CD0.05	5.18	7.59	8.17	NS	0.76

Figures under parentheses are arc sine transformed values

T = Auxin – chemical formulations C = Cutting type S = Season

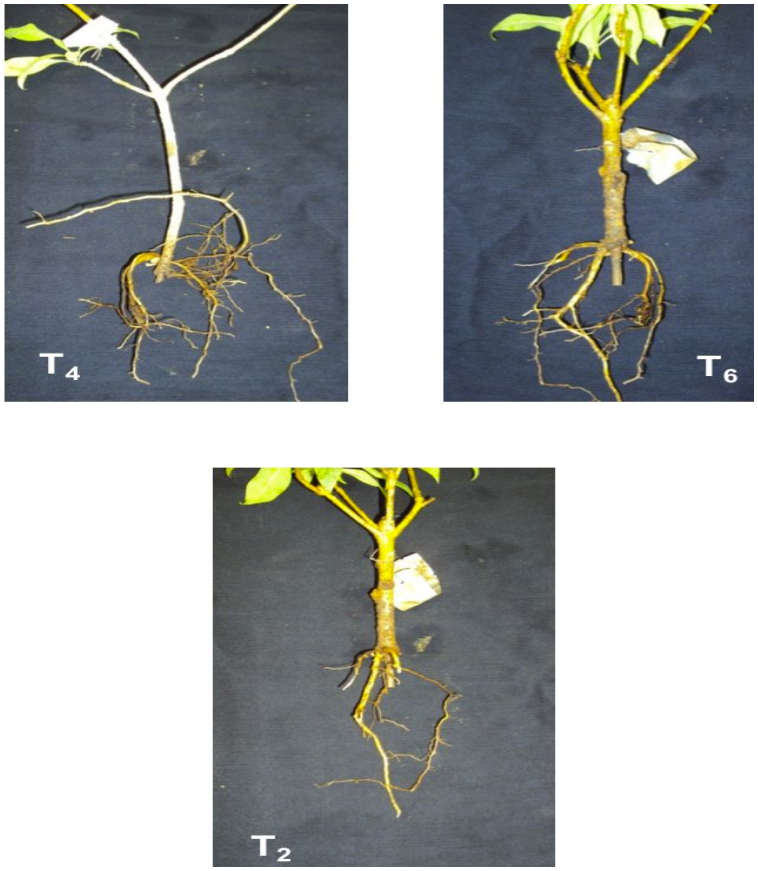

Plate 1: Rooted Cuttings of *Pittosporum floribundum* as Affected by Chemical Formulations during Spring Season

Plate 2: Rooted Cuttings of *Pittosporum floribundum* as Affected by Chemical Formulations During Rainy Season